A CASE STUDY EXAMINATION:

DEVELOPING A RETAIL STORE RENOVATION DESIGN ACCORDING TO THE LEED RATING SYSTEM

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CHAPTER I

INTRODUCTION

Developing a retail environment that is both sustainable and profitable can be challenging for interior designers. Retail development accounts for the largest portion of commercial growth in the United States. Research shows that retailers renovate their stores an average of once every five to seven years (Piotrowski and Rogers, 2007). Therefore, it is imperative that the retail industry adopt a more sustainable approach to store design and production processes. This rapid growth and high competition is creating a need for more innovative design solutions that incorporate sustainability. In retail, the bottom line is often the main objective and business owners can be slow to accept sustainable practices. Interior designers must be able to identify problem areas and fully educate the business owner on the importance and long term benefits sustainability provides not only to the design of the space, but the day to day operations of the business.

The use of sustainable practices in retail has been shown to improve employee productivity, increase customer perception and spending, and reduce the operating costs over the life of the business. These reasons along with the positive environmental impact of sustainable design are beginning to turn a few heads in the retail industry. In the past, additional construction costs and time restraints have been barriers to creating sustainable retail establishments. The trend is rapidly changing and many projects are being completed under budget and on time while incorporating sustainable practices. However,

retail design will still have a long way to go before sustainability is fully integrated into the retail industry.

The purpose of this study is to evaluate an existing retail store and production site and to propose a design solution that follows a sustainable framework. This framework will be developed by examining the U.S. Green Building Council's (USGBC) Leadership in Energy and Environmental Design (LEED) rating system and other sustainable practices. The criteria will then be combined to suit the specific needs of the client. The proposed design will combine the ideas of sustainability and increased efficiency in both the interior environment and the production processes. These two ideas working together should create a more profitable retail business for the client while reducing the negative impact on the environment and improving the overall interior environment for employees and customers.

CHAPTER II

REVIEW OF LITERATURE

Introduction

The retail sector of the U.S. economy is highly competitive with sales of $3.8 trillion a year and stores continuing to open at a high rate each year (Piotrowski and Rogers, 2007). The stores themselves impact our environment during construction and through their daily operations once opened. Therefore, it is important for interior designers and retail business owners to understand the importance of incorporating sustainability into the design of new and existing structures. New information shows that using sustainable principles in retail design not only improves a buildings effect on the environment, but it improves employee productivity, customer satisfaction and reduces operating costs while improving brand image (Wilkinson & Yun, 2006). This paper will examine the U.S. Green Building Council's (USGBC) Leadership in Energy and Environmental Design (LEED) rating system and how 17B, an apparel store located in Stillwater Oklahoma, can be renovated using LEED's framework.

LEED for Retail

The LEED rating system was created in 1999 in order to assist designers, contractors, and business owners in developing sustainable structures. These structures reduce the negative impact on the environment and human health through a whole-building approach to design. LEED provides a framework for assessing building

performance while raising consumer awareness of sustainable design (Bonda & Sosnowchik, 2007). In April 2007, a new pilot program for LEED was introduced by USGBC. This program, LEED for Retail Pilot version 2, addresses the specific needs of retail stores by identifying six areas of performance: sustainable sites, water efficiency, energy and atmosphere, materials and resources, indoor environmental quality, and innovation and design process ("Green Building Rating System LEED for Retail-New Construction and Major Renovations", 2007). Each of the six areas is broken down into subcategories and carries a certain point value. The number of points a project receives determines the level of certification. Table 1 shows the breakdown of the six performance areas and the maximum point value for each.

	Project Checklist	**Points Possible**
1.	Sustainable Sites	16
2.	Water Efficiency	5
3.	Energy & Atmosphere	17
4.	Materials & Resources	13
5.	Indoor Environmental Quality	14
6.	Innovation & Design Process	5
	Project Total	70

Table 1: LEED Project Checklist

From the 70 points possible in the LEED for Retail system, there are four levels of certification: *Certified* 26-32 points, *Silver* 33-38 points, *Gold* 39-51 points, and *Platinum* 52-70 points. Although there are six areas of performance, only areas 4, 5 and 6 which encompass Materials and Resources, Indoor Environmental Quality and Innovation and Design Process /Other will be examined for this project due to their importance and applicability to the client.

Materials and Resources

The Materials and Resources section of LEED for Retail consists of one required prerequisite and seven credit sections totaling 13 possible points. The goal of this performance standard is to reduce the amount of waste that is deposited in landfills and to create alternative methods for disposal including recycling and/or reuse programs. The required prerequisite is Storage and Collection of Recyclables and the seven credit sections are: Building Reuse, Construction Waste Management, Materials Reuse, Recycled Content, Regional Materials, Rapidly Renewable Resources, and Certified Wood ("Green Building Rating System LEED for Retail-New Construction and Major Renovations", 2007). Table 2 shows the point distribution of prerequisites and credits for Materials and Resources.

Materials & Resources	13 Possible Points
Prereq 1 Storage & Collection of Recyclables	Required
Credit 1.1 Building Reuse, Maintain 75% of Existing Walls, Floors & Roof	1
Credit 1.2 Building Reuse, Maintain 95% of Existing Walls, Floors & Roof	1
Credit 1.3 Building Reuse, Maintain 50% of Interior Non-Structural Elements	1
Credit 2.1 Construction Waste Management, Divert 50% from Disposal	1
Credit 2.2 Construction Waste Management, Divert 75% from Disposal	1
Credit 3.1 Materials Reuse, 5%	1
Credit 3.2 Materials Reuse, 10%	1
Credit 4.1 Recycled Content, 10% (post-consumer + 1/2 pre-consumer)	1
Credit 4.2 Recycled Content, 20% (post-consumer + 1/2 pre-consumer)	1
Credit 5.1 Regional Materials, 10% Extracted, Processed & Manufactured Regionally	1
Credit 5.2 Regional Materials, 20% Extracted, Processed & Manufactured Regionally	1
Credit 6 Rapidly Renewable Materials	1
Credit 7 Certified Wood	1

Table 2: Materials & Resources Criteria

Indoor Environmental Quality

Indoor Environmental Quality is comprised of two required prerequisites and eight credit sections totaling 14 possible points. The goal of this performance standard is to improve the indoor environment for the building occupants and to minimize the exposure to Environmental Tobacco Smoke (ETS). The two required prerequisites are Minimum Indoor Air Quality (IAQ) Performance and ETS Control. The eight credit

sections include: Outdoor Air Deliver Monitoring, Increased Ventilation, Construction IAQ Management plan, Low-Emitting Materials, Indoor Chemical and Pollutant Source Control, Controllability of Systems, Thermal Comfort, and Daylighting and Views ("Green Building Rating System LEED for Retail-New Construction and Major Renovations", 2007).

Improving the indoor environmental quality has been known to have a large impact on employee satisfaction, health, mood, performance and reduce employee absences and health care costs to the company (Bonda & Sosnowchik, 2007).It also has been related to increased sales due to improved current customer's perception of the space, and the ability to attract the attention of new customers (Bonda & Sosnowchik, 2007). Table 3 shows the point distribution of the two prerequisites and eight credits for Indoor Environmental Quality.

Indoor Environmental Quality	**14 Possible Points**
Prereq 1 Minimum IAQ Performance	Required
Prereq 2 Environmental Tobacco Smoke (ETS) Control	Required
Credit 1 Outdoor Air Delivery Monitoring	1
Credit 2 Increased Ventilation	1
Credit 3.1 Construction IAQ Management Plan, During Construction	1
Credit 3.2 Construction IAQ Management Plan, Before Occupancy	1
Credit 4 Low-Emitting Materials	4
A. Adhesives & Sealants (1Point)	
B. Paints & Coatings (1Point)	
C. Flooring (1Point)	
D. Composite Wood & Agrifiber Products (1Point)	
E. Furniture (1Point)	
F. Ceiling & Wall Systems (1Point)	
Credit 5 Indoor Chemical & Pollutant Source Control	1
Credit 6 Controllability of Systems, Lighting and Thermal Comfort	1
Credit 7.1 Thermal Comfort, Design	1
Credit 7.2 Thermal Comfort, Employee Verification	1
Credit 8.1 Daylight & Views, Daylight 75% of Spaces	1
Credit 8.2 Daylight & Views, Views for 90% of Spaces	1

Table 3: Indoor Environmental Quality Criteria

Innovation and Design Process / Other

The last section to be examined is Innovation and Design Process / Other. This performance standard is more loosely defined than the others. It is worth five points and consists of two sections: Innovation in Design and LEED Accredited Professional. This performance standard focuses on encouraging interior design professionals to go above and beyond the requirements set by LEED. First, a project can be awarded up to four points if a project uses any systems or design features that exceed the basic LEED requirements. These points must be pre-approved in the registration process to be acquired, and they are specific to each project. The second portion of the Innovation and Design Process section encourages design professionals to become LEED accredited by offering one point if a project has a LEED accredited member on the design team (“Green Building Rating System LEED for Retail-New Construction and Major Renovations”, 2007*)*. Table 4 shows the point distribution of credits for Innovation and Design Process.

Innovation & Design Process	5 Possible Points
Credit 1.1 Innovation in Design	1
Credit 1.2 Innovation in Design	1
Credit 1.3 Innovation in Design	1
Credit 1.4 Innovation in Design	1
Credit 2 LEED Accredited Professional	1

Table 4: Innovation & Design Process Criteria

Sustainability in Retail

Although it is not always feasible to create a LEED certified environment, interior designers should strive to use sustainable practices whenever possible. Sustainability is especially crucial for retail designers as the U.S. Department of Energy reported, “Retail buildings occupy more space than any other segment of the commercial market”

(Wilkinson & Yun, 2006, p. 42). Fortunately many large retailers are beginning to use LEED guidelines as the standard for construction in their new stores.

Wal-Mart is perhaps the best known retailer incorporating sustainable design practices into their new stores. They opened their first sustainable supercenter in McKinney, Texas in 2005. Wal-Mart approaches sustainable design from two directions, first during the construction phase and then during the daily operations phase. During construction Wal-Mart requires energy conservation and recycling of building materials. Then during the operations stage of design they employ several sustainable systems to reduce waste and conserve energy (Stribling, 2007). These include using skylight, radiant floor heating, rainwater collection and filtration system, and a wind turbine (Wilkinson & Yun, 2006).

Whole Foods grocery stores also utilize sustainable retail design. Currently Whole Foods has two LEED certified stores. These stores use several sustainable design methods including solar power, recycled building materials, and use of wood produced through sustainable forestry methods (Stribling, 2007).

PNC Financial Group is also getting attention for its new bank branches that use sustainable design ideas. Firstside Center, the original project, received a *Silver* rating from LEED in 2000 (Needy, Ries, Gokhan, Bilec & Rettura, 2004). The company partnered with the internationally known interior design firm, Gensler, to create a prototype building that will be used for all their newly constructed branch locations. The company employed several techniques in achieving the *Silver* Certified locations including picking sustainable sites, using regionally available materials and natural lighting sources. “The company estimates that it is saving about $100,000 on the

construction of each branch using local sources and recycled materials, and that that branches will save about 45% in energy costs once they are up and running" (Stribling, 2007).

In the past, sustainable design has been perceived as an added expense and thus was not often utilized by business owners. Recent research identifies a cost savings over the long term when sustainable design practices have been used. A report by PricewaterhouseCoopers and Urban Land Institute found that sustainable design generates up to 35% savings while only increasing initial building cost 10% (Stribling, 2007). Partnered with the increased productivity of employees and improved public perception of retailers that use sustainable practice it makes sense for retail designers to incorporate sustainable design ideas when planning new stores or renovating existing stores.

The Retail Client: 17B

17B is a small locally owned apparel store located in the downtown district of Stillwater, Oklahoma. The owner creates his own line of apparel and leather accessories and also sells vintage clothing. The product development and retail space are housed in the same building. 17B was selected for this project based on the in-house processes that are used to create the clothing and accessories. Leather finishing and screen printing are done in a work room adjacent to the sales floor which creates the perfect environment to apply the LEED for Retail principles outlined in the earlier sections of this paper. Not only will the retail space be renovated according to the LEED for Retail criteria the operational processes will be updated also.

The goal of this retail store design renovation is to increase product production and revenue for the owner while decreasing the negative environmental effects of the finishing and printing processes themselves. The proposed store design will apply sustainable ideas to the leather finishing and screen printing systems and incorporate a new more energy efficient lighting system in order to improve the indoor environmental quality of the store. The new design will also include an interior renovation of the sales floor using sustainable materials and finishes. In order to begin design development for the space, the two processes, leather finishing and screen printing, must be fully understood. The following sections will examine the leather finishing and screen printing processes as they are used in the store, and will point out which steps require attention during the renovation phase of the project according to their impact on the environment or indoor air quality.

Leather Finishing

In order to create the leather accessories for his line of apparel, the owner begins the process by ordering vegetable tanned hides from an outside leather vendor. Vegetable tanning has been used since prehistoric times when ancient civilizations realized raw hides that were treated with a solution of plants, certain tree bark or even leaves and water would not decay thus creating the earliest version of vegetable tanning. Vegetable tanning still remains highly popular today due to the availability of materials and the simplicity of the process (Thorstensen, 1969). During the tanning process plants, bark, leaves or roots are finely separated or chopped and then immersed in water. Tannins from the plant life leach out creating the solution the skins are treated in (Sharphouse, 1971).

Vegetable tanned hides are preferred by the store owner due to their ability to be manipulated unlike oil tanned hides whose appearance cannot be changed in any way. Vegetable tanned hides are the only type that can be tooled and are easier to finish, take dye very well, and are in some cases waterproof (Hobson, 1977). The store owner receives some prefinished scrap pieces from a leather belt manufacturer. This leather is already treated, dyed or painted and is only embellished and cut into bracelets or key fobs.

Once the hides arrive at the store they are ready to be cut into more manageable pieces. The large hides come in rolls that the store owner cuts into small rectangles approximately 11x48 inches. The leather is then put into a clicker press that cuts the leather according to the shape of metal die being used. At this store, bracelets and key fobs are made using a metal die a hollow piece of metal used to punch out a particular shape. There are no environmental concerns with this step of the process however a designated electrical outlet must be set aside in the renovation plan for the clicker press.

After the shapes are punched out the leather is ready to be embellished with studs or painted. The store owner currently uses spray paint or latex house paint on the leather. A torch is also used to add a vintage effect on some of the pieces. These two steps of the finishing process create toxic fumes that will need to be addressed in the renovation design due to their effect on indoor environmental quality.

When making bracelets the end with the closure holes must be ground down in order to close correctly. This step creates dust and particles which also affects the indoor air quality and will need to be further evaluated during the design phase. The leather

finishing process is then complete and the finished accessories are moved to the sales floor.

Screen Printing

Stenciling or screen printing techniques date back to Roman and Early Egyptian times, but the most notable innovators to the stenciling process are the Japanese with their ability to create floating objects in the screen by connecting the images with human hair or strands of silk (Henning, 1994). It was Samuel Simon of Manchester who first used silk fabric as the screen in 1907. Shortly after World War 1, John Pilsworth of San Francisco invented the first multi-color printing unit (Biegeleisen & Cohn, 1958) In the 1920's further innovation came through the introduction of the squeegee and the use of synthetic screens over silk ones made it more cost effective to print. Since these improvements the industry has been growing and printing processes are becoming more environmentally friendly (Henning, 1994).

The store owner orders t-shirts pre-dyed through an outside vendor therefore no dying or fabric processes will be examined in this project. A basic screen printing process is used to custom print apparel for the store. To begin the process the blank screens are coated with a photo emulsion. Photo emulsion is a light sensitive material that is coated onto a screen to make a stencil (Henning, 1994). Due to the light sensitive properties of the emulsion the coating process is done in a dark room or other area with no direct UV rays. Once the emulsion dries a transparency of the image is taped on top of the screen. These two are then placed into the exposure unit with a vacuum. This unit contains a halide and two fluorescent lights and the vacuum removes all the air so that the image exposes clearly onto the screen. The places that the light hits on the screen harden the

emulsion and the places where the transparency protects the screen from the light remain soft. Once the screen is removed from the exposure unit it is washed with a power washer and all the areas where the emulsion did not get exposed to light wash away leaving the stencil image in the screen. This step affects the environment due to the contamination of the ground water as the emulsion is washed down the drain. A reclamation system will be addressed in the renovation plan to curb the disposal of toxic chemicals.

After the screen has been washed, it is ready to print the image onto the t-shirts. The owner uses Plastisol inks to print with because they do not dry until heat set. Once the image is printed the shirt is placed under a flash dryer to set the dye. During this step the sizing is burnt out of the shirts and creates fumes that need ventilation and will need to be addressed during the renovation design phase. The excess ink is then removed from the screens and returned to the ink containers. The screens are then washed with an orange oil solvent to remove the photo emulsion before being reused. The owner uses the orange oil based solvent because it is less hazardous than mineral spirits and can be disposed of without as much damage to the environment. During this step the owner does not use paper towels to clean the screen with. He buys old shirts from thrift stores in order to cut back on waste. Even though some precautions are being sought during this step to be environmentally conscious further evaluation will be needed in order to comply with the LEED criteria during the renovation phase of the design.

Summary

After reviewing the LEED rating system criteria and the leather finishing and screen printing processes used in the production of the apparel and accessory line the renovation design phase of the project can now begin. As stated in the previous sections

several key aspects of the apparel and accessory production will need to be evaluated and corrective steps put in place in order to follow the framework developed for this project in accordance to LEED. It is important to note that LEED points will not assessed for this project rather an assessment of whether general LEED intentions are established through the design. This project will conclude with a fully renovated proposal of the workshop and sales area that not only provides better functionality but a more sustainable environment for the store owner, employees and customers. Ideally, the project will convey the importance of sustainability in a retail environment and provide a model of implementation for reducing energy, preserving natural resources, and having a positive impact on both the environment and overall profitability of the store.

CHAPTER III

METHODOLOGY

The methodology for this project was divided into four phases: Analysis of Existing Conditions, Programming, Assessment of LEED Criteria, and Design Development. Each phase is discussed further in this chapter in order to provide insight to the creative process for this project, and to provide an introduction to the results of the applied methodology.

Phase 1: Analysis of Existing Conditions

The first step in the design process was to analyze the overall conditions of both the retail space and the work space at 17B. The building's measurements and physical characteristics such as building materials, electrical layout, existing lighting, HVAC, furnishing and fixtures were documented. This information was then compiled into an existing floorplan from which the proposed design was developed. During this phase, photo documentation was made of both the retail space and the workshop in order to establish adjacency diagrams and identify possible furnishing and fixtures for re-use.

Phase 2: Programming

After the initial analysis was complete, the programming phase began by interviewing the owner of 17B, Jeremy Borum. The interview identified the client's needs with regards to equipment, storage, work space, merchandise display, and lighting

for the renovation as well as the store image and customer experience he expected. This phase also determined the overall project goals and objectives and design concept.

Phase 3: Assessment of LEED Criteria

An assessment of LEED criteria followed the programming phase to determine the most efficient and effective ways to satisfy both the project's goals and objectives and implement the greatest number of LEED practices for the renovation. Methods of satisfying LEED criteria were researched and the most viable options were then selected for the three performance areas this project has been structured around; Materials and Resources, Indoor Environmental Quality and Innovation and Design Process.

Phase 4: Design Development

The design development stage was then conducted utilizing all the information gathered from the previous three phases. This phase included space planning, selection of materials, finishes, and equipment, and the creation of presentation drawings. During this phase careful consideration was taken to not only meet the goals and objectives set forth by the client but to meet the criteria established by LEED.

CHAPTER IV

FINDINGS

This chapter explains the proposed design in accordance with the four Methodology phases: Analysis of Existing Conditions, Programming, Assessment of LEED Criteria, and Design Development. The next chapter will examine the proposed design and its compliance with LEED performance areas: Materials and Resources, Indoor Environmental Quality, and Innovation and Design Process.

Phase 1: Analysis of Existing Conditions

This section provides the foundation for the design process. All physical attributes of the space were taken into account in order to create a dimensioned base plan of the space along with an existing reflected ceiling plan (RCP) and electrical plan. It is important to note that currently the space has no central heat and air. The client uses electric heaters in both the retail space and the workshop and cools the space via a window AC unit. Also, the only ventilation for the workshop comes from a homemade exhaust fan through the ceiling and the opening of the garage door when needed.

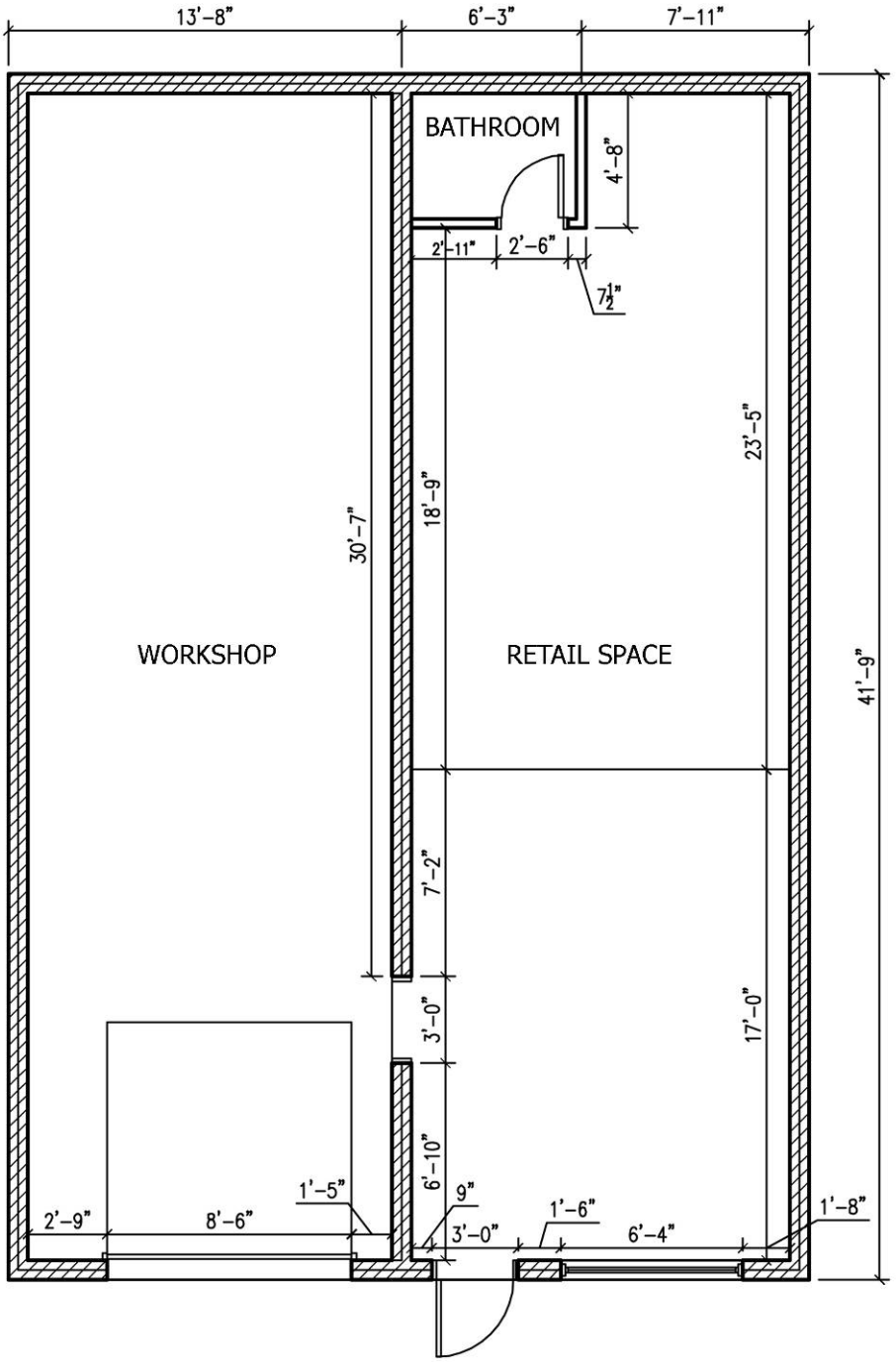


Figure 1: Dimensioned Base Plan

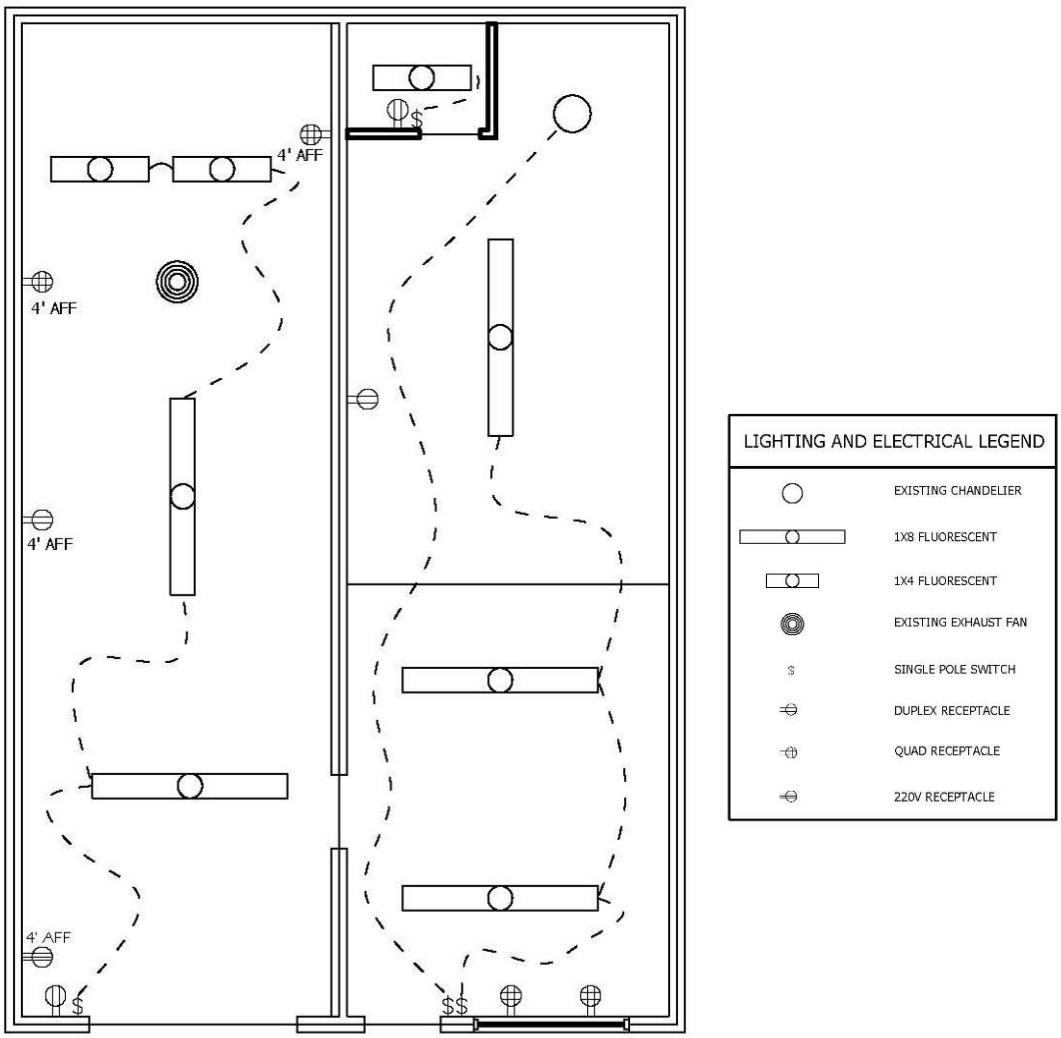
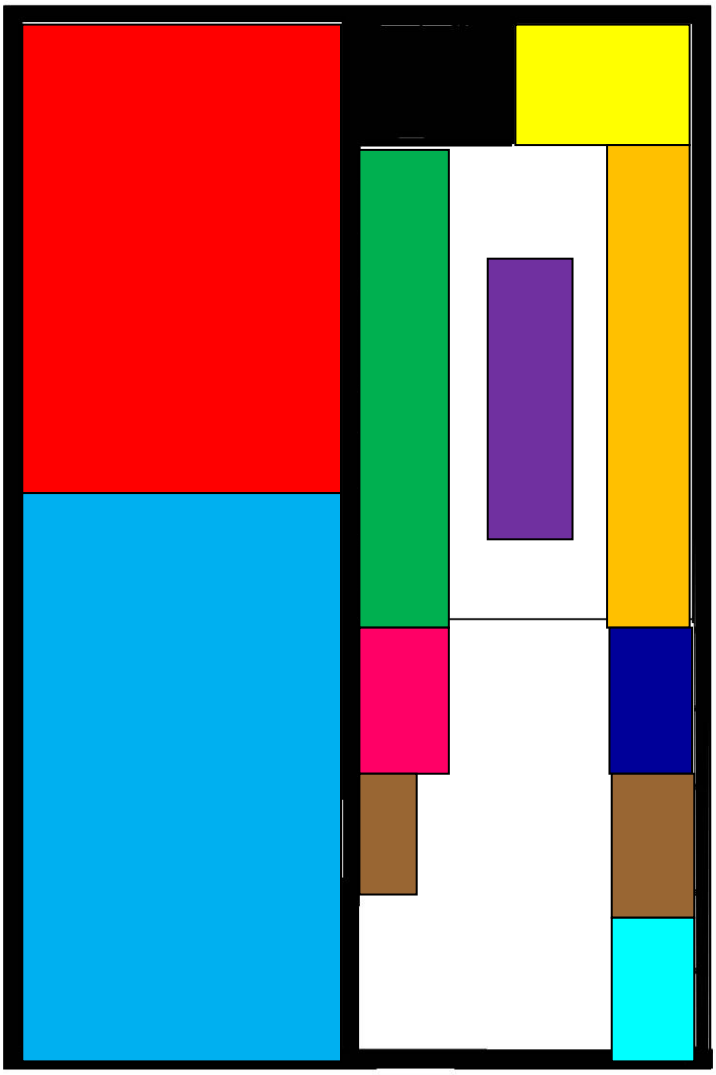


Figure 2: Existing RCP/Electrical Plan

All existing furnishings, fixtures, and equipment (FF&E) were inventoried in order to identify reusable materials for both the retail space and the workshop. The reusable materials/fixtures are addressed in Phase 3: Assessment of LEED Criteria. Photo documentation was also an important part of Phase One. These photos were used to establish existing adjacencies and to further understand the client's requirements for storage, display, and work surfaces. The photographs are located in Appendix A.



Adjacencies Legend	
Color	**Description**
	Screen Printing
	Leather Finishing
	Vintage Jeans/Boots
	Women's
	Belts
	Men's
	Women's Vintage
	Men's Vintage
	Leather Bracelets/Gifts
	Cash wrap

Figure 3: Existing Adjacencies

Phase 2: Programming

A programming interview was conducted with Jeremy Borum, the owner of 17B, on October 18, 2007. This interview identified the client's overall needs and the store's merchandise mix and sales percentages. The results of the interview determined the goals and objectives for the project as well as the design concept. The following section

contains the findings from the interview and introduces the project's goals, objective statement and design concept.

Merchandise Mix, Display and Sales Percentages				
Merchandise	**Existing Display**	**Back Stock**	**Renovation Request**	**% of Sales (avg.)**
Men's Shirts	100	0	100	25
Women's Shirts	50	0	100	20
Hats	30	0	60	5
Handbags	20	0	40	1
Men's Vintage shirts	200	0	200	5
Vintage Jeans/Pants	30	0	30	2
Women's Vintage	50	0	50	2
Boots	25	0	25	5
Belts	40	0	50	5
Cuffs	75	200	N/A	25
Buckles	30	0	50	2
Gifts/Clocks	4	0	10	1
Necklaces	50	0	50	2

Table 5: Merchandise Mix, Display and Sales Percentages

Existing Storage and Needed Storage		
Existing Storage	**Quantity**	**Requested Quantity**
Screen Storage	83	125
Ink	23	40
Shirt storage	500	1,000
Embellishments(beads, studs, etc)	30 varieties	150 varieties
Leather storage	1 shelf/5 hides	5 shelves/25 hides
Dyes	65	same
Cleaning supplies	3 bottles	5 bottles
Hot Stamp Dies	0	50
Clicker Press Dies	0	50
Rack for Belts	1/100 belts	2/200 belts
Spray Paint	35	same
Latex Paint	20	same
Bulletin Board	0	1 large

Table 6: Existing Storage/Needed Storage

Existing Equipment and Upgrade Needs		
Equipment	**Existing OK**	**Upgrade**
Exposure Unit	Yes	
Printing Press	Yes	
Wash out booth	No	washout booth
Dryer	Yes	
Hole punch	Yes	
Leather tools	Yes	
Grinder	Yes	
Clicker press	Yes	
Heat stamp	Yes	
Exhaust system	n/a	New system
Spray paint booth	No	needs ventilation
Sound system	Yes	
Security system	n/a	New system
HVAC	No	Central H/AC
Cash register	Yes	
Screen Drying Rack	n/a	20-25 screen rack
Heat Press	Yes	
Stud Setter	Yes	
Cutting Table	n/a	7ft table
Drill Press	Yes	
Air Compressor	No	15 gallon
Spindle Sander	Yes	
Dust Collection System	n/a	New system
Shop Vac	Yes	
Grinder	Yes	
Pressure Washer	Yes	

Table 7: Existing Equipment and Upgrade Needs

Project Goals and Objectives

All of the above information was carefully considered and the overall project goals and objectives were established as follows:

1. Provide client with more overall storage for the workshop.
2. Provide an enclosed storage space for t-shirts.
3. Improve lighting in both the workshop and retail space.
4. Improve overall sales.
5. Reduce overall operating costs.
6. Provide more work surfaces.
7. Implement new exhaust, dust collection, HVAC and security systems.
8. Maximize organization of the workshop.
9. Improve retail sales display quantities.
10. Provide ample back stock storage for merchandise.
11. Create a “Vintage Chic” environment for the retail space.
12. Incorporate the client’s passion for the color red, nature, and vintage items.

These goals and objectives were important to the assessment of LEED criteria that took place in Phase 3. Once the goals and objectives were established a design plan was developed that efficiently satisfied both client and LEED criteria.

Design Concept

During this phase, the client's ideas about the perception of his store were also examined in order to come up with a concept for the design. A short brainstorming session was held during the interview and the client was asked to list words or ideas that he felt represented his line of clothing and his store. The overall image he would like his store to convey to the consumer and the overall image of the brand he sells were both taken into account when determining a design concept. Outlined below are excerpts of the main ideas expressed during the brainstorming session.

Brainstorming Session Ideas/Concepts:

- Where creative, original people shop
- Trendsetters
- Images and themes from Jeremy's life used throughout design
- Likes to hunt
- Wild life and Nature
- Creates "special" items
- Likes the color red
- Creative use of lighting
- Using unconventional materials for new uses
- Vintage items
- Recycling and reused items

The overall concept for the design was established as "Vintage Chic". This concept reflects both the owner's passion for unique merchandise that his customers will treasure for years and the implementation of reused, recycled and antique elements for the overall design of the store. The concept also reflects the finishes that will be used throughout the design. Reclaimed metals, distressed wood, exposed brick and stained concrete floors make up the major finishes found throughout the retail area. The one-of-a-kind pieces and vintage resale items that the owner sells are also reflected in the concept of "Vintage Chic". This concept also encompasses the main goal of creating a sustainable environment that stems from recycling and reusing.

Phase 3: Assessment of LEED Criteria

After the conclusion of the first two phases, a better understanding of client needs was obtained and a clearer image of the proposed design was beginning to develop. Before design development could begin, the next step was to identify what LEED criteria could and should be met during the renovation and the most efficient way to achieve these criteria. Having the project goals and objectives clearly defined, research was conducted in three LEED performance areas, Materials and Resources, Indoor Environmental Quality, and Innovation and Design Process, as to how meeting the project goals would also compliment achieving the LEED criteria. The findings were then narrowed down into the most efficient and effective methods for meeting the criteria under the scope of this project. Given the criteria for the three performance areas of LEED, the methods below adequately accomplish sustainable design while achieving the goals and objectives of the project set forth in the previous section.

Methods of Implementation:

- **Materials and Resources**
  - Recycle bins for paper and ink residue.
  - Recycle clothes hangers.
  - All existing walls, floors and roof to remain.
  - All interior walls, ceiling systems to remain.
  - All cardboard packing materials recycled.
  - Fixtures not being reused will be donated.
  - Reuse of fixtures:
    - 3x3 Grid wall panels
    - All standards, rods, hangers, and hanging hardware
    - Bust forms
    - Leather cuff display units (metal and wooden table top fixtures)
  - Reuse of Equipment:
    - Exposure Unit
    - Printing Press
    - Flash Dryer
    - Leather tools
    - Grinder

        - Clicker Press
        - Heat stamp Press
        - Stud setting machine
        - Sound system
        - Spindle Sander
        - Drill Press
    - Reuse brick taken from front window expansion for side window fill.
    - New retail wall units constructed from reclaimed wood and pipe.
    - Nesting tables purchased from retail fixture resale vendor.
    - All display hardware purchased from retail fixture resale vendor.
    - All shelving units, work benches, tables, storage units for workshop will be purchased from the Stillwater Lowes Home Improvement Store.
    - HVAC will be purchased and installed by local contractor.
    - All cosmetic materials will be purchased locally.
    - No exotic woods will be used.
    - All woods for framing and decking of loft will be certified wood.

- **Indoor Environmental Quality**
    - Install "No Smoking" signs on the exterior of building.
    - Install CO2 monitors in retail space and workshop.
    - Install garage door with adjustable opener for outdoor ventilation.
    - Install exhaust system for spray paint booth.
    - Install Central Heat and Air unit with HEPA filter and fresh air control to workshop.
    - Install dust collection system in workshop.
    - No adhesives to be used for flooring installation.
    - All interior paint not to exceed VOC limits of 50g/L
    - Concrete stain not exceed VOC limits of 250 g/L
    - Retail displays, work surfaces, shelving and storage materials will not contain urea-formaldehyde resins.
    - Install door partition between workshop and retail space.
    - Install new controllable lighting system in retail space.
    - Improve lighting levels in workshop.
    - Increase front window area.
    - Replace current garage door with opaque glass door and increase size of door.
    - Install awning over garage door and front window to support passive solar heating.
    - Glazing for front door and window.

- **Innovation and Design Process-Other**
    - Occupant recycling of dyes.
    - Water filtration for ink removal.
    - Low flow toilet installed.
    - Low flow/High pressure sprayer for wash out booth.
    - Energy efficient lighting workshop and retail space.

- Green education program (signage displayed on sustainable factors and benefits of the building).

Phase 4: Design Development

Design development was the final phase of the project. This section combines the findings of the three previous sections into presentation documents that the client would evaluate and ultimately accept or reject the proposed design. The proposed design documents include: Coded Floorplan, RCP/Electrical Plan, Elevations of Retail and Workshop Areas, Perspectives of Retail Area and Workshop, Adjacencies Diagram, Proposed Façade, and FF&E schedule.

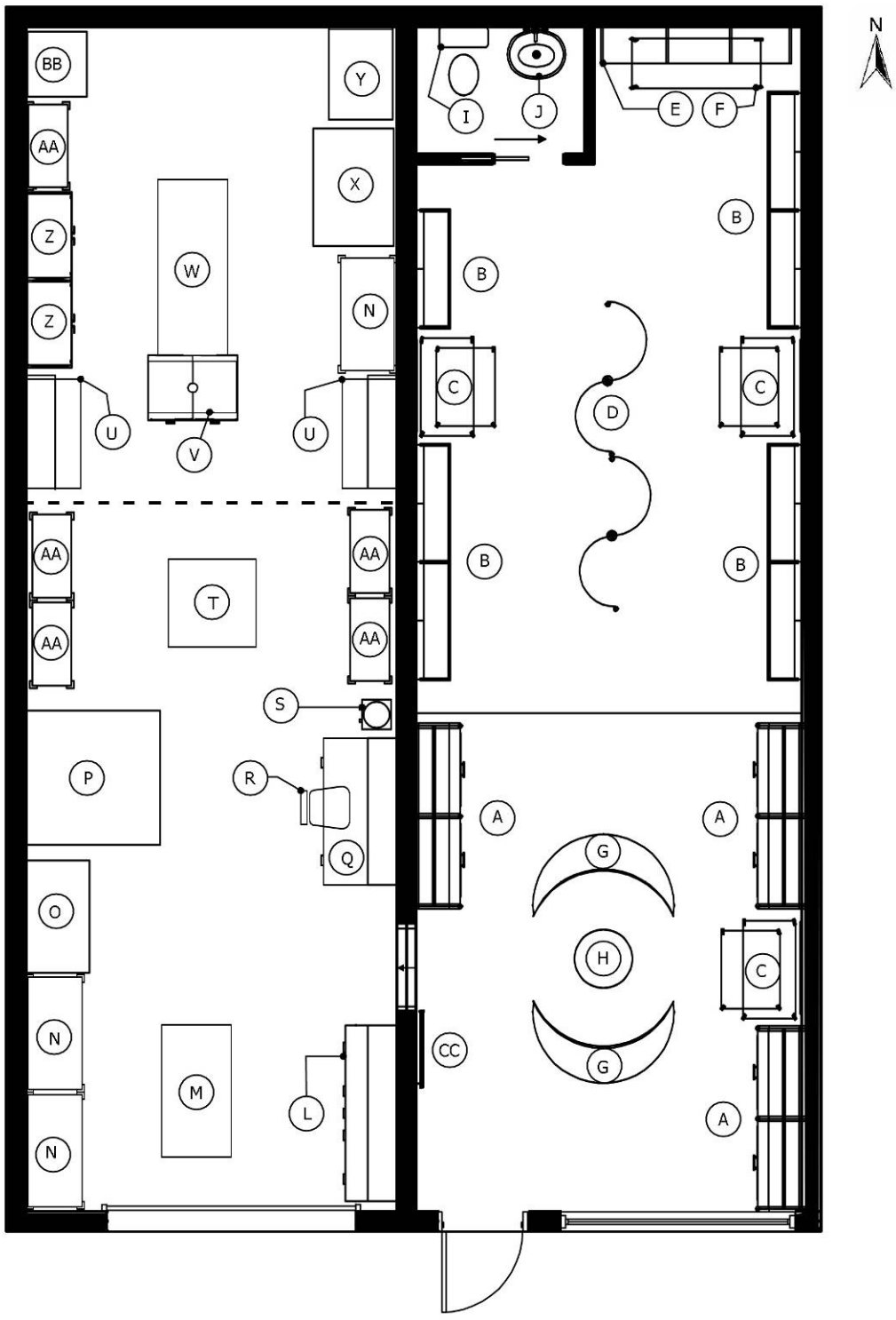


Figure 4: Proposed Floorplan

Coded Floorplan Legend		
Code	**Description**	**Quantity**
A	Custom Wall Units	6
B	3”x3” Grid Wall w/ Clothes Rod	7
C	Nesting Tables	3
D	S-Clothes Rack	2
E	Boot Display	1
F	Display Table	1
G	Bracelet Showcase	2
H	Cash wrap	1
I	Dartmouth Toilet	1
J	Serif Pedestal Sink	1
K	Dust Collection System	1
L	Storage Credenza w/ Overhead Cabinets	1
M	Leather Tooling Table	1
N	Large 5-tier shelving	3
O	Heat Stamp Press	1
P	Clicker Press	1
Q	Desk/Filing system w/ Overhead Cabinets	1
R	Bulldog Desk Chair	1
S	Water Cooler	1
T	Embellishment Table	1
U	Workbench w/ Bulletin Board and Overhead Cabinets	2
V	Spray Booth w/ Exhaust System	1
W	Screen Printing Table	1
X	Exposure Unit	1
Y	Washout Booth	1
Z	T-shirt Locker	2
AA	Small 5-tier Shelving Unit	5
BB	Screen Rack	1
CC	Sliding Door	1

Table 8: Proposed Floorplan Legend

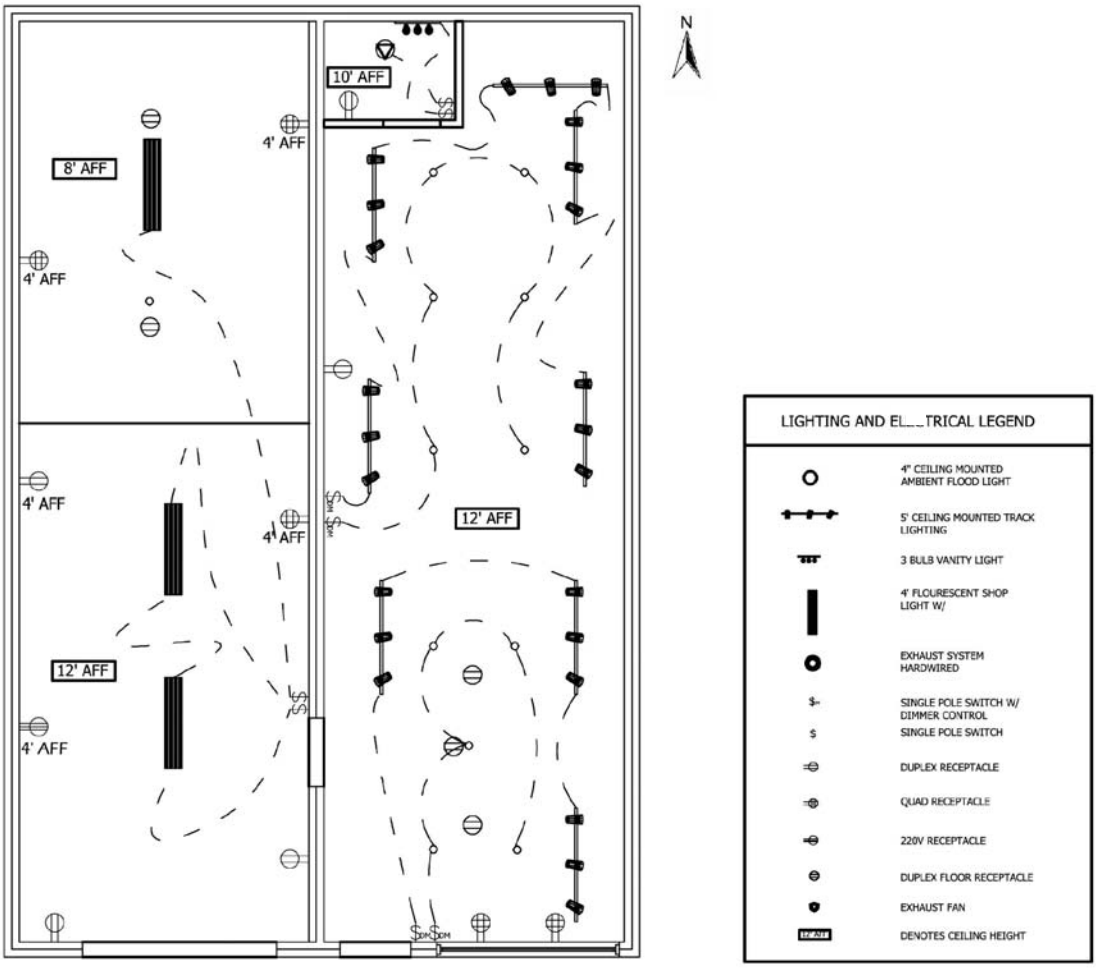


Figure 5: Proposed RCP/Electrical Plan

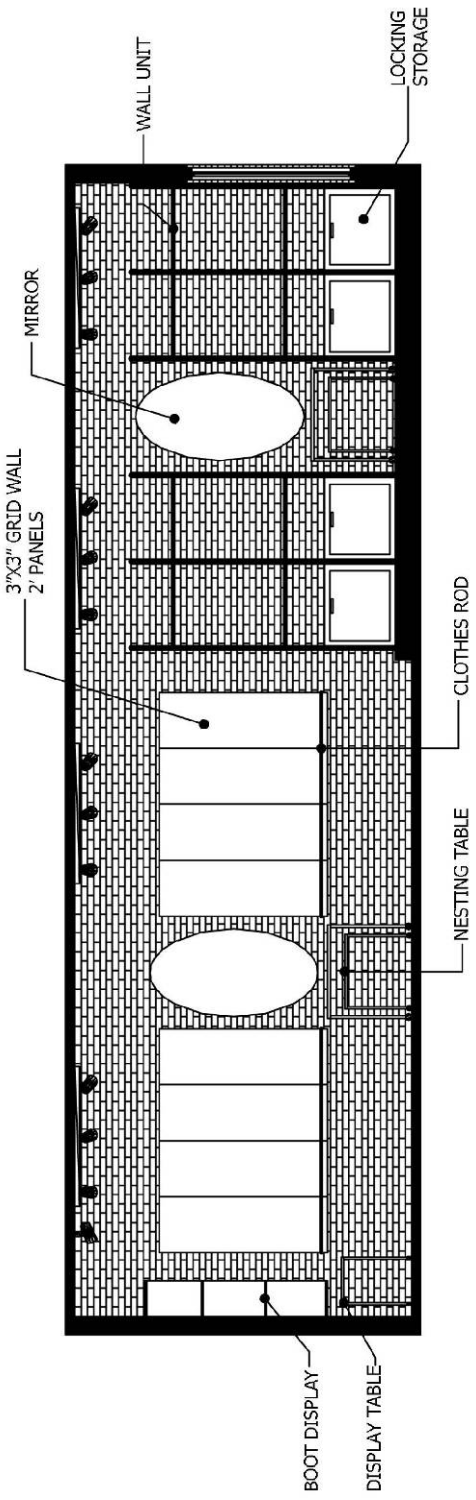


Figure 6: Elevation of Retail Area

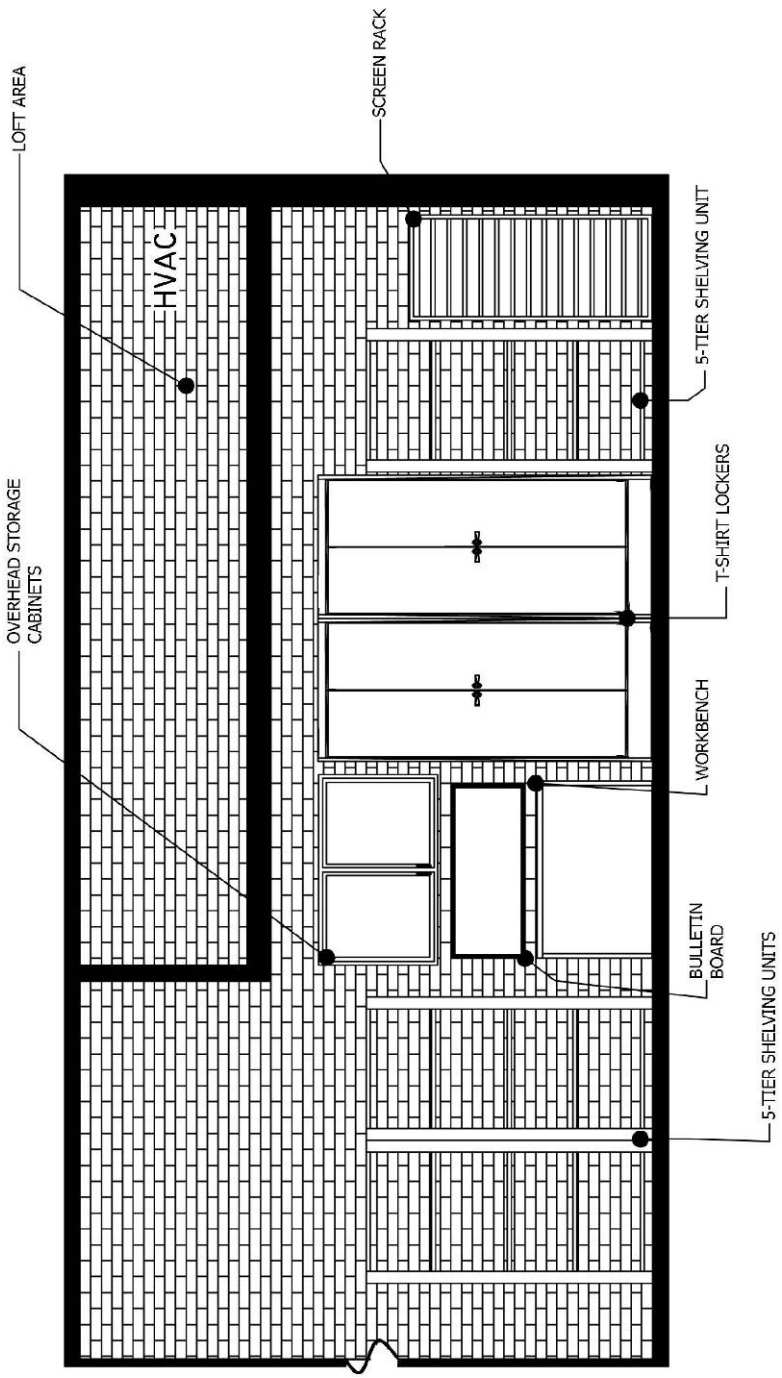
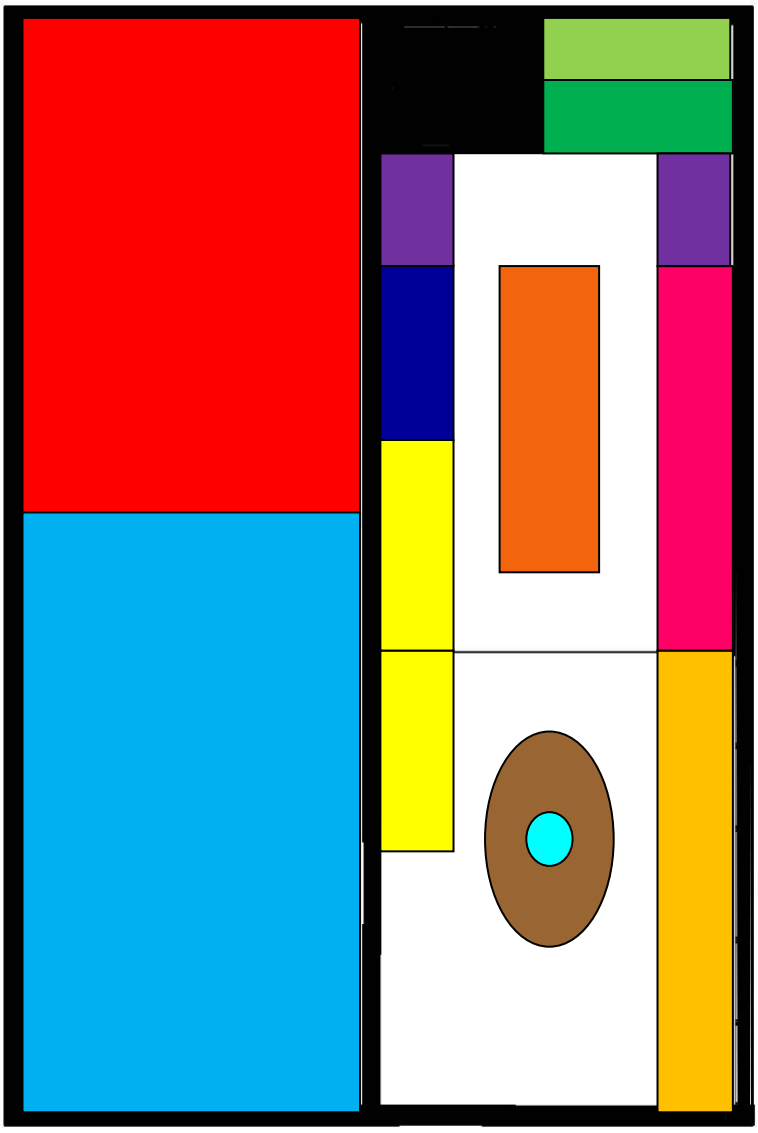


Figure 7: Elevation of Workshop

Figure 8: Perspective of Retail Area

Figure 9: Perspective of Workshop



Adjacencies Legend	
Color	**Description**
	Screen Printing
	Leather Finishing
	Boots
	Women’s
	Belts
	Vintage Jeans
	Men’s
	Women’s Vintage
	Men’s Vintage
	Leather Bracelets
	Gifts
	Cash wrap

Figure 10: Proposed Adjacencies

Figure 11: Proposed Facade

FF& E Schedule				
Code	**Description**	**Vendor**	**Dimensions (HxWxD)**	**Qt**
A	Custom Wall Units	Capitol Store Fixtures	9'6"x3'x1'6"	6
B	3"x3" Grid Wall w/ Clothes Rod	Client	2'x6'	7
C	Nesting Tables	Bethel Store Fixture	36"x 40"x 30"(overall)	3
D	S-Clothes Rack	Capitol Store Fixtures	54"x 72"x29"	2
E	Boot Display	Client	Modify to fit	1
F	Display Table	Bethel Store Fixtures	2'6"x 5'x 2'6"	1
G	Bracelet Showcase	Capitol Store Fixtures	4'x 4'9"x 2'9"	2
H	Cash wrap	Capitol Store Fixtures	2' radius 36"ht	1
I	Dartmouth 2 Piece Toilet	Toto	16 1/8"X 21 5/8 "X 28 ½"	1
J	Serif Pedestal Sink	Kohler	35"x24"x18"	1
K	Turbo 1 Dust Collection System	Fein	17.75 lb	1
L	Storage Credenza w/ Overhead Cabinets	Twenty Gauge	36"x 72"x 24"	1
M	Leather Tooling Table	Client	36"x 72"x 30"	1
N	Large 5-tier shelving	Lowes	72"x 48"x 24"	3
O	Heat Stamp Press	Client	36"x 46"x 26"	1
P	Clicker Press	Client	48"x 55"x 55"	1
Q	Desk/Filing system w/ Overhead Cabinets	Client	36"x 60"x 30"	1
R	Bulldog	Knoll	36 ½"x 23 ½" x 20 ½"	1
S	Water Cooler	Client	48"x12"x 12"	1
T	Embellishment Table	Client	36"x 36" x 36"	1
U	Workbench w/ Overhead Cabinets & Blt Bd	Lowes	36"x 46"x 24"	2
V	Spray Booth w/ Exhaust System	Paasche Air Brush Co.	21"x 21" x 26"	1
W	Screen Printing Table	Twenty Gauge	36"x 72"x 30"	1
X	Exposure Unit	Client	36"x 48"x 33"	1
Y	Washout Booth and Power Washer	Lawson Screen Printing	72"X36"x 18"	1
Z	T-shirt Locker	Cisco-Eagle	72"x 36"x 18"	2
AA	Small 5-tier Shelving Unit	Lowes	72"x 36"x 18"	5
BB	Screen Rack	Silk Screening Supplies.com	61"x 26 ½"x 25"	1
CC	Sliding Door	Advance Door Sales	9'x3'x 3"	1
DD	Flash Dryer	Client	Included on table	1
EE	Printing Press	Client	Included on table	1
FF	Mirrors for Retail Area	Excel Glass	6'x3' oval	3
GG	Alcyon Lytespot Track Lighting	Lightolier	Cylinder 22MC6	8
HH	Ceramic Metal Halide Lamps	Dyna-Bright Lighting		24
II	Fluorescent Luminaries	Client	4'x1'	3
JJ	Fluorescent Bulbs- T12, 34 watts	Dyna-Bright Lighting		24
KK	Bathroom Vanity Fixture-4337	Sea Gull Lighting	4 ¼ " x 30"x 2 ¼"	1
LL	Vanity bulbs- 100w G25 Med C	Lowes		3
MM	Calculite Cylinder Lighting	Lightolier	4" C4CS39T4E1	11
NN	120 V Ceramic Metal Halide T4 Lamps	Dyna-Bright Lighting		24
OO	Energy Star HVAC	Stillwater Mechanical Plumbing	TBD by Electrician	1
PP	ADT Security System	Falco Alarm Company	TBD by Technician	1
QQ	Garage Door	Advanced Door Sales Inc	9'x8'6"	1
RR	Front Window/Glazing	Streets Windows and Siding	6'x8'	1

Table 9: FF& E Schedule

CHAPTER V

CONCLUSION

This chapter discusses the final outcomes of the design proposal and reviews the sustainability implications that would occur if the proposed design was implemented. The chapter is comprised of two sections. The first section explains the final outcomes of the design from a retail business and aesthetic perspective, and the second explains the sustainable design methods, systems and materials in greater detail.

Design Evaluation

The scope of this project included several goals and objectives, but three main goals took priority for the client. They were: improve overall storage, improve lighting, and improve sales. While the design was able to accommodate all of the client's requests his three main needs were given special attention. The following sections identify the three main goals and explain of how each was satisfied.

Improve Overall Storage

Increasing the storage area available was the most challenging issue of the project given the small footprint of the building. However, the impact of two design elements created an organized and functional space for the client. The first was the additional storage created by the loft area in the workshop. This area will provide the client with space to store boxes of leather scraps, hides, t-shirts, supplies, and extra tools that are not

accessed every day. It will also increase the usable space below in the workshop by clearing out the unnecessary items.

The second design element is the locking storage provided by the custom wall units in the retail area. These wall units will provide a back stock area for extra t-shirts, bracelets, belts or gifts that are not being displayed. Along with these two elements the design provides the client with enclosed lockers to store his t-shirts. The lockers will keep the unprinted shirts safe from stray paint splatters and dust that accumulates in the workshop. Overall, the design dramatically improved the store's storage capabilities both in the workshop and on the sales floor.

Improve Lighting

After the initial interview with the client, it was clear that he was very interested in improving the lighting in his store. The existing fixture included only fluorescent strip lights and one small chandelier. To improve the lighting on the retail side of the space track lighting was installed around the perimeter. Additional ambient lighting was installed down the center portion of the space as well as over the showcases and cash wrap area. In addition, the front window area was increased allowing more natural light to enter the space. Natural light will reduce the need for artificial lighting resulting in reduced operating costs to the owner.

In the workshop, the existing fluorescent strips were reconfigured to improve the lighting distribution. During the exposure stage of the screen printing process low light levels are needed therefore the placement of the light was adjusted leaving the back portion of the workshop less lit. The front section of the workshop contains most of the leather finishing tools and maximum light levels are needed. The installation of a custom

garage door with opaque window panels increases natural light to the otherwise windowless workshop. The completed lighting design provides not only natural light to the space but improves the merchandise displays playing a key role in the third goal discussed in this section.

Improve Sales

17B is a small privately owned retail that does not have the financial strengths of a retail chain. This makes improving sales a top priority for the owner, Jeremy Borum. The final design incorporates new display fixtures, lighting and visual merchandising to accomplish this goal. The new layout increases the quantity of merchandise that can be displayed at one time. The fixtures are designed to be versatile allowing the client to rearrange the store depending on his inventory. As mentioned in the previous section the lighting enhances the merchandise as well as the strategic placement of the three large mirrors.

Upon evaluating the retail adjacencies, it was noted that an adjustment to the merchandise layout should be made. By altering the location of merchandise, the design brings the custom apparel from the back of the store to the front into the direct view of all customers entering the space. It also relocates the Boot display to the back wall providing a focal point upon entrance and announces to the customers that, “Boots are sold here”. Perhaps the most important change was to the leather bracelet display area. In the existing plan they were located in the front corner of the store. Considering that the leather bracelets make up 25% of total sales it was imperative that they be given a prime location in the store. The centrally located showcases allow for customers to easily admire the vast selection while increasing display capacity as well. The overall

improvements to merchandise location should have a dramatic impact on sales by providing greater visibility to the original pieces Jeremy creates.

Sustainability Factors

The purpose of this project was not only to renovate 17B in accordance with the owner's criteria, but to renovate the space in accordance with the LEED performance areas of Materials and Resources, Indoor Environmental Quality and Innovation and Design Process. The final design proposal encompasses the intent of each of these performance areas by the design methods, systems, and materials specified. This section will examine what sustainable implications could be assessed if the proposed design was implemented.

Materials and Resources

Several methods were outlined in Chapter Four under the Materials and Resources section of those reuse and recycling are at the forefront of the final proposed design. By reusing furnishings, equipment, implementing recycling and purchasing display fixtures from resale vendors the design is able to minimize cost while decreasing the amount of construction and demolition waste disposed of in landfills. Donating those fixtures not specified in the design also improves the sustainability of the design by decreasing waste and increasing the owner's community service quotient.

Another sustainable practice outlined in the design is purchasing goods locally. This practice uses the privately owned store status to its advantage by specifying materials, furniture, and equipment from local vendors therefore reducing transportation costs, pollution and contributing to the local economy. Given the intent of this performance area it is concluded that the proposed design meets the criteria fully.

Indoor Environmental Quality

Two main considerations were taken for this performance area. Reducing indoor pollution and improving human comfort levels. The proposed design addresses these two issues by the installation of special systems and the increased use of daylighting. The HVAC, dust collection and exhaust systems improve air quality while the increased area of natural light improves the level of human comfort in the space.

The addition of dimmable lighting paired with the increase of natural light to the space decreases energy consumption and saves the owner money on utilities. The installation of an awning on the South facing garage door and front window also contribute to energy efficiency. The awnings provide a source of passive solar heating. Window glazing should also be noted as an important design component. This technique reduces the amount of damaging UV that enters the store while reducing heat loss. The glazing also increases the safety of the large window by providing shatter resistance. These design elements along with the methods listed in Chapter Four satisfy each of the criteria given for the LEED performance area of Indoor Environmental Quality.

Innovation and Design Process

The final LEED performance area selected for this project is Innovation and Design Process. Although recycling, filtration and education techniques are all specified in the proposed design, water and electric efficiency will be addressed in this section as they make the largest contribution to sustainability. Experts predict, “by 2025 at least 65 nations will experience serious water shortages” (Bonda and Sosnowchik, 2007, p.44). This statistic and the fact that the screen printing process uses large amounts of water

each day made the ability to reduce water waste the aim of the proposed to design. Three systems were specified in the proposed design to accomplish this task.

First the screen printing process was examined and a low flow high presser sprayer was specified to be used in the washout booth. The sprayer will improve the ability to clean the screens without using excess water supply. The second system involving the screen printing process is the installation of a water filtration system for the washout booth. This system filters the ink debris and chemicals from the drain water into a holding tank. The water in the tank can then be re-used for cleanup or other applications where non-potable water can be used. The final method specified regarding water efficiency is the installation of a low flow toilet. The Toto Dartmouth toilet rates 1.6 gallons per flush and is ADA compliant. The installation of this toilet will save approximately 3.4 gallons of water per flush.

As for lighting efficiency, reducing the amount of fixture in the workshop and increasing the natural lighting capacity in the workshop will save on electricity consumption. Also the use of dimmable lighting in the showroom and installing energy efficient light fixtures in the showroom will reduce energy costs as well. These improvements will improve the sustainability of the building design, increase the employee and customer comfort levels as well as meet the criteria set forth by LEED. Overall, the final proposed design addresses the needs of the client by improving the overall functionality and profitability of the store and meets the intent of all three LEED performance areas outlined in the scope of the project.

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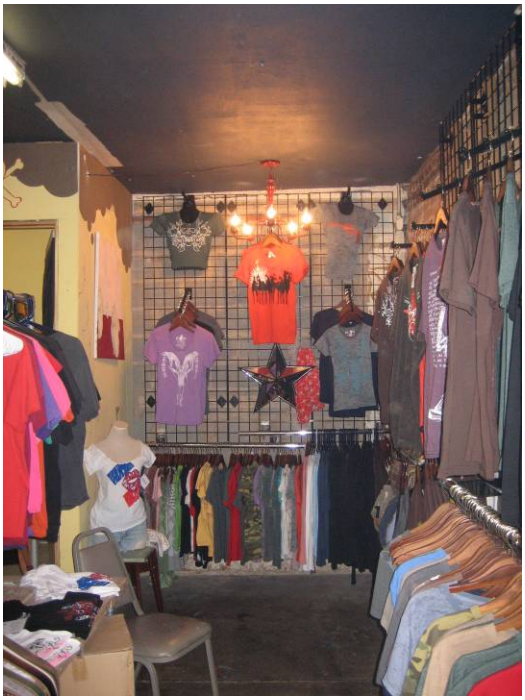
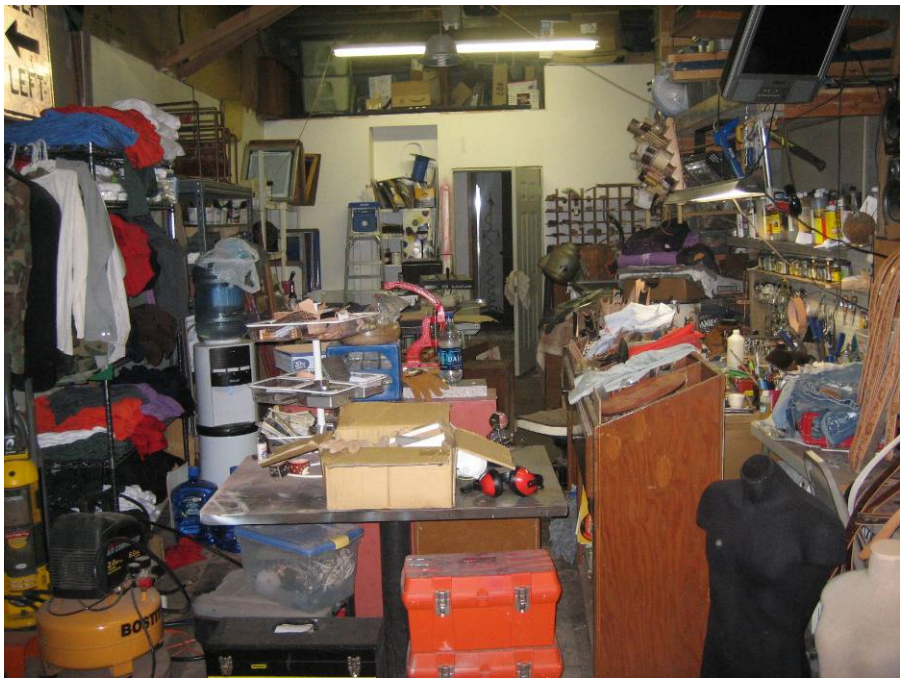
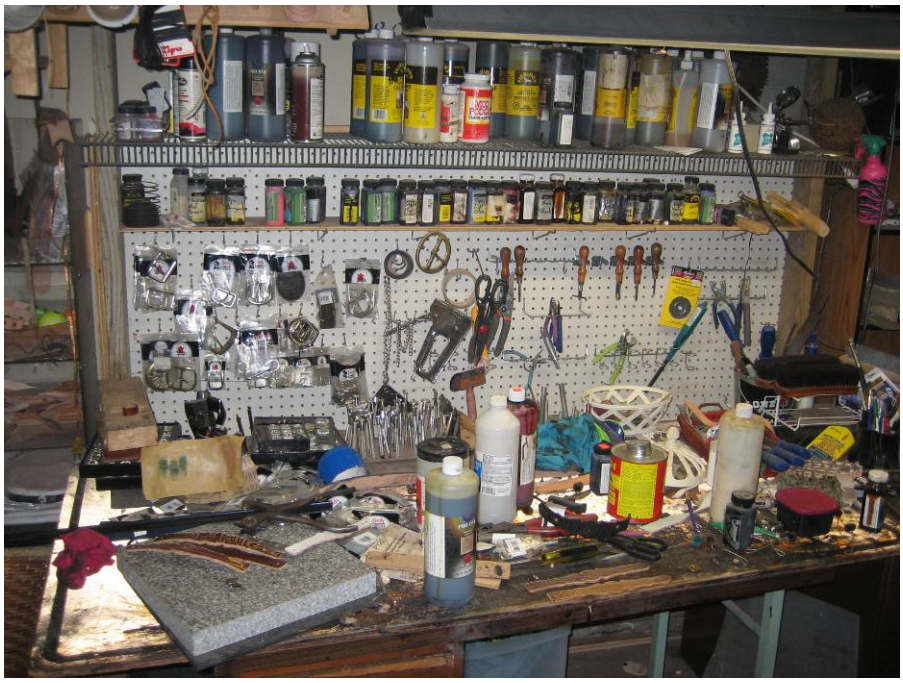
APPENDIX A

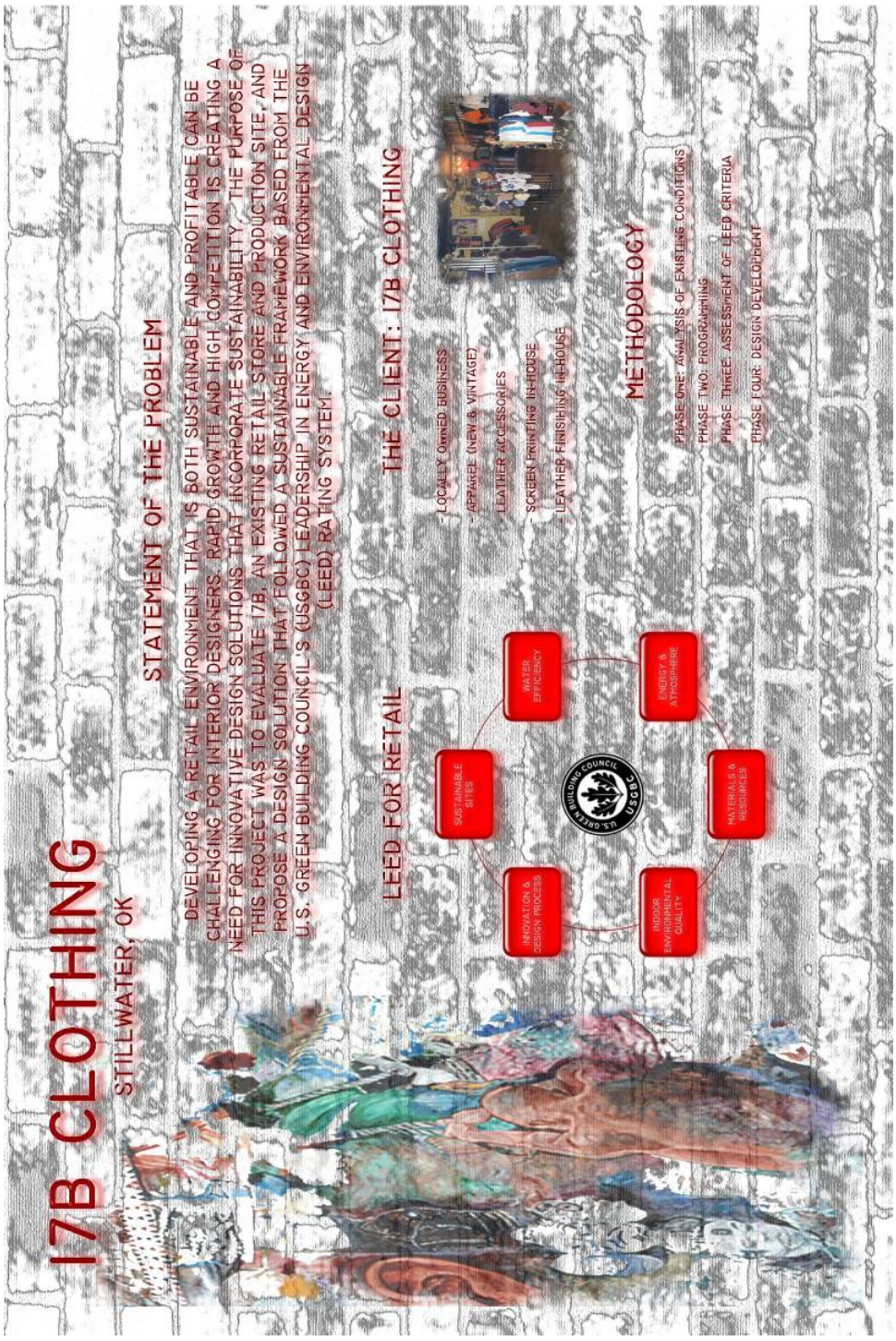






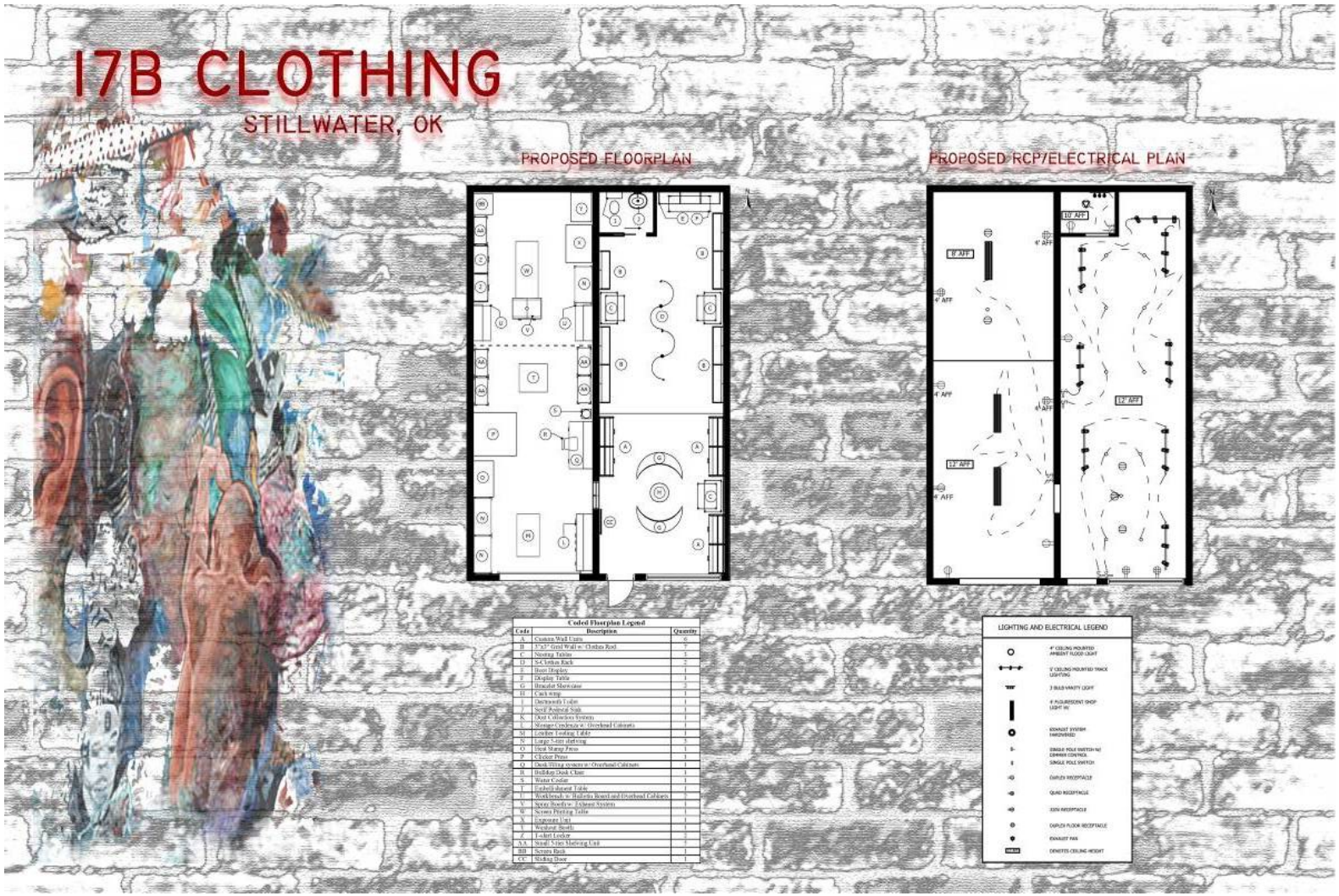

DELTA
ShopMaster
DeWALT

APPENDIX B


I7B CLOTHING
STILLWATER, OK
STATEMENT OF THE PROBLEM
DEVELOPING A RETAIL ENVIRONMENT THAT IS BOTH SUSTAINABLE AND PROFITABLE CAN BE CHALLENGING FOR INTERIOR DESIGNERS. RAPID GROWTH AND HIGH COMPETITION IS CREATING A NEED FOR INNOVATIVE DESIGN SOLUTIONS THAT INCORPORATE SUSTAINABILITY. THE PURPOSE OF THIS PROJECT WAS TO EVALUATE I7B, AN EXISTING RETAIL STORE AND PRODUCTION SITE, AND PROPOSE A DESIGN SOLUTION THAT FOLLOWED A SUSTAINABLE FRAMEWORK BASED FROM THE U.S. GREEN BUILDING COUNCIL'S (USGBC) LEADERSHIP IN ENERGY AND ENVIRONMENTAL DESIGN (LEED) RATING SYSTEM.
LEED FOR RETAIL
SUSTAINABLE SITES
WATER EFFICIENCY
ENERGY & ATMOSPHERE
MATERIALS & RESOURCES
INDOOR ENVIRONMENTAL QUALITY
INNOVATION & DESIGN PROCESS
U.S. GREEN BUILDING COUNCIL USGBC
THE CLIENT: I7B CLOTHING
- LOCALLY OWNED BUSINESS
- APPAREL (NEW & VINTAGE)
- LEATHER ACCESSORIES
- SCREEN PRINTING IN-HOUSE
- LEATHER FINISHING IN-HOUSE
METHODOLOGY
PHASE ONE: ANALYSIS OF EXISTING CONDITIONS
PHASE TWO: PROGRAMMING
PHASE THREE: ASSESSMENT OF LEED CRITERIA
PHASE FOUR: DESIGN DEVELOPMENT

17B CLOTHING

STILLWATER, OK



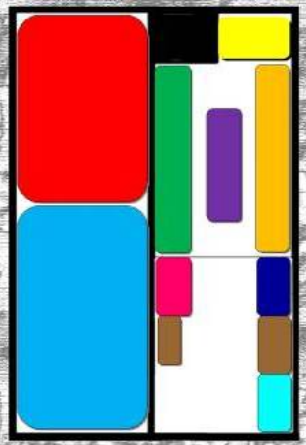
I7B CLOTHING

STILLWATER, OK

EXISTING FACADE

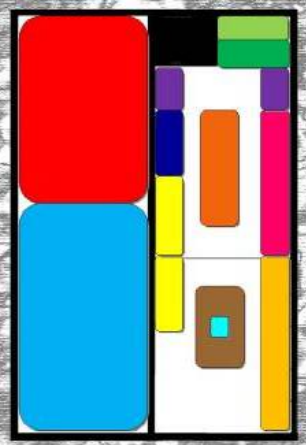
PROPOSED FACADE

EXISTING ADJACENCIES



Adjacencies Legend	
Color	Description
	Screen Printing
	Leather Finishing
	Vintage Jeans/Boots
	Women's
	Belts
	Men's
	Women's Vintage
	Men's Vintage
	Leather Bracelets/Gifts
	Cash wrap

PROPOSED ADJACENCIES



Adjacencies Legend	
Color	Description
	Screen Printing
	Leather Finishing
	Boots
	Women's
	Belts
	Vintage Jeans
	Men's
	Women's Vintage
	Men's Vintage
	Leather Bracelets
	Gifts
	Cash wrap


17B CLOTHING
STILLWATER, OK
RETAIL AREA
PERSCPECTIVE
WORKSHOP
PERSPECTIVE
RETAIL AREA ELEVATION
WORKSHOP ELEVATION

VITA

Heather LeAnn McKinley

Candidate for the Degree of

Master of Science

Thesis: A CASE STUDY EXAMINATION:
DEVELOPING A RETAIL STORE RENOVATION DESIGN ACCORDING TO THE LEED RATING SYSTEM

Major Field: Interior Design

Biographical:

Personal Data: Born March 22, 1981 in Hobart, Oklahoma the daughter of Steve and Cheryl McKinley.

Education: Graduated from Mustang High School in 1998; received Bachelor of Science in Interior Merchandising from Oklahoma State University in 2002; completed the requirements for the Master of Science or Arts in Interior Design at Oklahoma State University, Stillwater, Oklahoma in May 2008.

Experience: Worked in visual merchandising for four years upon completion of Bachelors degree. Employers include Cantoni Inc and Fossil Inc. While attaining a Masters Degree was employed with Oklahoma State University from the spring semester of 2007 to present as a Teaching and Research Assistant for the Department of Design, Housing and Merchandising.

Name: Heather L McKinley Date of Degree: July, 2008

Institution: Oklahoma State University Location: Stillwater, Oklahoma

Title of Study: A CASE STUDY EXAMINATION:
DEVELOPING A RETAIL STORE RENOVATION DESIGN
ACCORDING TO THE LEED RATING SYSTEM

Pages in Study: 55 Candidate for the Degree of Master of Science

Major Field: Interior Design

Scope and Method of Study: Developing a retail environment that is both sustainable can be challenging. Interior designers must educate businesses on the importance of sustainability. Sustainable practices have been shown to improve employee productivity, increase customer perception and spending, and reduce the operating costs . The purpose of this study was to evaluate an existing retail store and production site and to propose a design solution that followed a sustainable framework. This study illustrates how 17B was renovated using LEED's framework.

Findings and Conclusions: The methodology was divided into four phases: Analysis of Existing Conditions, Programming, Assessment of LEED Criteria and Design Development. The results determined the goals and objectives for the project and design concept. Research was conducted in three LEED performance areas to find the most effective methods for meeting the project goals. The methods accomplished sustainable design of the project.

ADVISER'S APPROVAL: Dr. Randall Russ